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## FOREST INSECT SURVEYS- LASSEN NATIONAL FOREST

Season of 1934.

### INTRODUCTION

The 1934 forest insect reconnaissance of the Lassen National Forest was conducted as an IMPNIRA project with the Forest Service and the Bureau of Entomology and Plant Quarantine cooperating. The field work was accomplished by a four man survey crew working from the 1st to the 30th of September.

The following are the approximate costs of this survey:

| ITEM                           | COST      | MAN DAYS |
|--------------------------------|-----------|----------|
| Field Labor                    | \$ 703.32 | 120      |
| Office Labor                   | 50.54     | 7        |
| Transportation & Miscellaneous | 19.10     |          |
| TOTALS                         | \$ 772.96 | 127      |

### HISTORY OF THE AREA

The area covered by the survey, containing approximately 321,000 timbered acres, bears a typical east side type stand. The greater portion of the volume is in pine timber, chiefly ponderosa and jeffrey pine in varying proportions, although white fir and some sugar pine timber is to be found on the higher elevations. The northern boundary of the area extends to the open, nontimbered areas of Fall River Valley which bear a covering of mountain mahogany, numiper and sagebrush. The eastern boundary also is bordered by semi-arid conditions and vegetation.

In comparing this area with the Happy Camp- Lava Beds area of the Modoc, we note a very similar type of overmature, open and park-like stand. However, the presence of a considerable amount of the more resistant Jeffrey pine species in the stand, the fact that the greater part of the merchantable timber lies above instead of below the 5,000 foot altitude level, and that a considerable portion of the area lies in the rain shadow of Mount Lassen, has resulted in more favorable conditions for tree growth and vigor and less favorable conditions for insect activity. In the past losses caused by insect activity, except at the lower elevations and on a few unfavorable sites on steep, rocky slopes having a southern aspect, do not appear to have been comparable to those of the Modoc areas. During the past four or five years, however, a gradual increase in insect damage has occurred, until this season infestations appear to be comparable to those occurring in the Modoc in 1926. The lag in

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response apparent in the Lassen areas appears to be due to the naturally lower pressure of environmental factors, such as moisture and temperature, which favored tree growth and vigor and retarded insect activity. However, continued trends resulting in deficiencies in moisture and increases in temperatures have resulted in increased pressure of the environment on the stands and more favorable conditions for the insects.

Previous to 1930 no forest insect surveys of a comprehensive nature were conducted in the Eastern Lassen Working Circle. During 1930 and in each subsequent year the Bureau of Entomology has sampled the area as a regular part of the forest insect regional survey program.

ECW funds and labor made possible the 1933 survey. This was followed by an IMPNIRA control project in the Willow Springs Unit during the winter of 1933-1934. The proposed 1934 insect control program has already been partially provided for from the same funds.

#### GENERAL INFESTATION CONDITIONS

On the basis of fall survey data of the 1933 season, it was estimated that the entire area would show an average reduction of about 41%. This was taken as a partial measure of the effectiveness of the extremely low temperatures of the winter of 1932-33 in causing brood mortality and subsequent reduction of losses. However, it was noted that the setback was only temporary; and that there was a marked trend towards increased insect activity during the latter portion of the 1933 season. The full extent of the rapid recovery was not apparent until the remainder of the 1933 losses were cruised during the 1934 survey. It is now known that a reduction of only about 4% was obtained but, when it is considered that the temperature-caused mortality occurred when the infestation was rapidly increasing, it can be considered significant that the losses were held to about the same level as those of the 1932 season. The effects of the setback of 1933 did not, however, extend to include the 1934 season.

Total losses for all units during 1934 show a 62% increase over those of 1933. Willow Springs, with an increase of 16.4%, exhibited the least increase, while Brockman Flat, with 160% increase, showed the greatest. In 1934 unprecedented losses apparently occurred in all but a few areas in the Eastern Lassen Working Circle.

The western pine beetle increased considerably in importance during 1934, while all other primary insects attacking ponderosa pine decreased. This agrees with information concerning the composition of infestations secured from the Modoc and Shasta National Forest surveys. In jeffrey pine the jeffrey pine beetle decreased in importance, while flathead borers increased considerably. Ponderosa pine losses increased from 90.7% of the total in 1933 to 93.8% in 1934. Jeffrey pine losses decreased from 9.0% to 5.8% for the same years, and sugar pine losses increased from .3 to .4%.

In 1933 normal forecasting practice resulted in the use of correction factors ranging from .24 to .92, and varying according to the date, of course. These factors gave results considerably lower than actual loss figures. Accordingly, estimates for 1934 have been made using factors varying from .55 to .67 which, on the average, are lower than those recommended by Keen.

#### INFESTATION CONDITIONS IN THE UNITS

Table I is a summary of plot cruise results, giving the figures for 1932, 1933 and the estimated losses for 1934. Table II gives the estimates for the entomological units of the area in terms of trees and volume per section and per unit. Figure 1 shows the losses per unit for the period during which the information is available. The location of sample plots and traverses cruised in 1934, as well as the boundaries of the entomological units, is shown in figure 2 (map).

Willow Spring Unit.- From Nov. 3, 1933 to March 21, 1934, an IMPNIRA control project was carried on in this unit. As a result 36.3 sections were treated, averaging 114.5 trees per section. This project, which covered approximately the western half of the unit, was originally outlined to include the Little Valley Area as well. However, unforeseen late season attacks, not allowed for in normal forecasting practice increased the number of infested trees to be treated and necessitated the curtailing of the Little Valley control project.

Although the complete results of the 1933-34 control project will not be available until the 1935 cruise is completed, it is evident the project exerted some influence. Infestation in the entire unit is estimated to have increased but 16.5% in 1934; That in the entire Eastern Lassen Working Circle shows an average estimated increase of 62.1% of the 1933 losses. On the controlled area the losses were held to about the same or to a slightly lower level than occurred in 1933. However, the presence of a severe epidemic infestation in the Little Valley portion of the area is reflected in the increase indicated by our estimate for the entire unit.

Under the date of Oct. 3, 1934, it was suggested that the Little Valley infestation was a control possibility. It should be restated, however, that the effectiveness of control in this area may be lessened by the relatively low quality of the timber, the critical environmental pressure and the presence of epidemic infestations in nearby privately owned timber. In any case control should be followed by salvage at the earliest opportunity.

Dixie Valley Unit.- This large unit, embracing fringe type timber as well as timber of excellent quality, has shown an increase during the past two years. An estimated increase of 100% occurred in 1934 and the loss is estimated to average 664 b.m. per acre. It is believed that in the better type timber areas, which are largely privately owned, control would result in reduced losses. However, with increased environmental pressure an infiltration of heavy losses into the better type timber would occur and control benefits would be cancelled, if control were not coupled with subsequent salvage and management of the stands.

Slate Mountain Unit.- The infestation tendencies of the Dixie Valley Unit, but of less intensity, also affect this unit. The timber is of poorer quality and subject to greater environmental pressure. Accordingly, control possibilities are limited. Estimates for this season place the loss at 370 b.m. per acre, which is an increase of 59.8% over the losses of 1933.

Gordon Creek Unit.- This unit exhibits considerably less increase in infestation tendency than do other nearby units. A loss of 154 b.m. per acre is estimated for this season, which is an increase of 24.9% over the loss estimates of 1933. No control is recommended, due to the fact that logging operations will, within a relatively short period, convert this area to one under management, and that control is needed more urgently elsewhere in the working circle.

Cave Mountain Unit.- Losses in this fringe-type timber are estimated to average 204 b.m. per acre in 1934, which is an increase of 60.2% over the loss of 1933. The increase in losses in this area is considered to be due largely to the increased environmental pressure, which has resulted in epidemic infestations to the south in the Brockman Flat Unit and near Eagle Lake. It is doubtful, considering the poor quality of the timber, the environmental conditions, the values at stake, and the necessity for control elsewhere, if control should precede logging, which should take place within ten years.

Brockman Flat Unit.- This unit reflects the tendencies observed outside the forest boundary south of Eagle Lake, by showing increases over 1933 amounting to 160.2%, and resulting in estimated average losses of 260 b.m. per acre. The percent increase is greater than in any other unit previously cruised, although the loss per acre is exceeded in five other units.

Much of this unit is highly marginal and of doubtful merchantability. Because of this no control is recommended, although salvage of merchantable stands, as soon as possible, is to be recommended.

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Logan Mountain Unit.- Logging operations have reduced the virgin pine stands in this unit to a comparatively small acreage. Two cut-over cruise plots were established in the cutover stands of this unit and on these the insect losses were slight. It is evident that the cutover areas in this unit are singularly clean and are of greater vigor, due to release by logging.

Crater Mountain Unit.- A loss of 144 b.m. per acre represents the lowest per acre loss of any unit for which estimates were made. The increase of 55.6% this season is below the average for all plots. Considering the low risk, due to the relatively favorable climatic condition the current infestation and the pressing need for control work elsewhere, no control is recommended in this unit this season.

Harvey Mountain Unit.- The timber in this unit has suffered a more or less chronic yet heavy loss since 1926. Heaviest losses occurred in 1932, closely followed in amount by the 1934 losses. Infestation is heavy on the south slopes of Harvey and Ashurst Mountain, particularly in the belt below the fir type and above the open stands bordering the flats. Both ponderosa and jeffrey pine are suffering. Estimates for 1934 show a per acre loss of 244 b.m. which is but a slight increase over the 1933 estimates.

Logging is rapidly reducing the greater portion of the virgin timber area in this unit to cutover status. The Black's Mountain Control Project, which covers the western part of the unit is <sup>now</sup> under way as recommended in our memorandum of Oct. 3, 1934. This project is an attempt to reduce the losses in the portion that will not be logged in the immediate future as well as to give a logical eastern boundary to the control project.

Cone Mountain Unit.- A marked similarity exists between the infestations of the Cone Mountain and the Harvey Mountain Units. Epidemic conditions prevail with an estimated loss of 285 b.m. per acre, an increase of 26.6% over the losses of 1933. The Black's Mountain Insect Control project will include in its boundaries the Black's Mountain Experimental Forest. This experimental area, containing approximately 10,000 acres has been set aside as a workshop for the study of grazing and forest management. Permanent logging roads have been laid out and are in the process of construction. The area has been divided into blocks, the stands of which will be cut, using different methods. The entire area is dedicated to research on the best methods of cutting east side stands, so as to obtain a sustained yield, to secure the most favorable age class and tree species distribution, and to reduce or control insect infestations through management or logging. Thus it is not only intended to remove infested trees by logging but also to manipulate the stand composition as to reduce those losses to a minimum. Due to expenditures already made in placing the experimental area on a permanent yield basis and the fact that future studies of insect losses in relation to methods of management are possible, the values to be protected by this project are high.

Funds to the amount of \$16,000 have already been allotted for

this control project, as requested in our memorandum of October 3 and the work is well under way at this date.

Bogard Unit.- The average per acre loss of this unit is 265 b.m. per acre, which represents an increase of 149.5% over the 1933 losses. Epidemic conditions exist that are similar, in amount of timber killed, to those in the Cone and Harvey Mountain Units, and entomological considerations would justify control this season.

The unit is diversified as to type, the northern portion is of good quality pine type, privately owned and suffering the greater losses. The southern portion, which is largely government controlled is mixed conifer and fir type, except for the western portion which is pine type of poor quality.

Butte Creek Unit.- An increase of 78.3% over 1933 losses resulted in an average loss of 196 b.m. per acre. Although the loss is not as heavy as in some other units, the infestation is considered to have distinct epidemic tendencies.

The sample of this unit is not considered to be adequate for a sound basis of estimate, largely due to the extensive area sampled by the single plot. The estimates for the unit should be considered as indicative of the general trend rather than as exact figures. Control is not recommended, chiefly due to the priority of the other areas.

#### INFESTATION CONDITIONS IN OTHER LASSEN AREAS

Eagle Lake.- The bench land on the southwestern border of Eagle Lake is privately owned and outside the forest boundaries. However, the influences of infestation in this area affect as well as agree with the trends of infestation in the Brockman Flat and possibly the Cave Mountain Units.

A six mile traverse which sampled the ponderosa pine type showed an estimated loss of 608 trees and 527,600 b.m. per section. This amounts to about 824 b.m. per acre that has been killed in the 1934 season. The infestation is primarily caused by the western pine beetle which infested over 90% of the attacked trees. An appreciable amount of sugar pine is being killed on the slopes.

Apparently, previous to 1933, this area was remarkably clean, as shown by the lack of snags. During 1933 groups of attacked trees were formed. With each succeeding generation during 1934, the groups have increased in size and have become scattered throughout the area. At the present time a decidedly epidemic conditions exists. Control in this area is chiefly of private concern, due to the ownership and the fact that it is outside the National Forest Boundary.

Willard Creek.- Eleven miles of traverse totalling 880 acres formed the sample of this basin. The average loss was found to be 149 b.m. per acre. Although this is a considerable loss and an increase over that of 1933, it is considered that no epidemic condition exists. The southern portion of the area carries good quality timber. However, the northern portion carries poor quality timber growing under extremely adverse conditions. Even with heavier losses, it is doubtful if benefits could be secured by control of infestations in the northern portion of the unit. Control is not recommended for this season.

West side type Infestations.- Observations made of 1934 losses in the timber west of Hat Creek and extending along the west slopes through Viola and south to Battle Creek showed infestations of an intensity greater than has been noted previously. The present infestation, though not yet of an intensity comparable to that of the east side type stands, is marked indication of spread of forest insect losses into previously practically uninfested stands.

#### CONTROL RECOMMENDATIONS

In our memorandum of October 3, 1934, three possibilities of control were suggested, based largely on expectations of activity on the part of the Forest Service. Of these the Black's Mountain Project, which covers about 22,600 acres and will result in the treating of about 6,000 trees, was definitely accepted. The Little Valley Project was tentatively accepted.

We feel that nearly all ponderosa pine stands in the surveyed portion of the Eastern Lassen Working Circle have infestations of sufficient intensity to warrant control. However, in recommending insect control projects on the basis of probable effectiveness, other factors than the amount of infestation must be taken into consideration. In the surveyed area are areas which, under the environmental conditions that have affected both stands and insects for the past several years, it is expected control would not yield results. There are others in which satisfactory results would be possible but, with continuation of present trends in environmental factors, would not be probable. There are still others in which satisfactory results should be secured from insect control.

The fringe type of the Lassen, which extends in a band of varying width along the northern and eastern margins of the surveyed area, the stands of which are subject to extremely unfavorable conditions, we do not feel should receive investments in the form of control projects. The reasons for this conclusion are the relatively low values of the timber, the high normal loss under present conditions and the fact that betterment of present day environmental trends would have to be much more than a minor fluctuation in the general trend in order to benefit the stands appreciably.

The areas in which control might give satisfactory results are the basins of better quality timber lying to the south and east of the marginal stands. In these basins the accumulated effects of abnormal environmental factors have not affected the stands to as great an extent as in the fringe type. There still remains a margin that, if fostered by even minor beneficial fluctuations in the environmental factors may be sufficient in increasing the health of the stand, or in inhibiting the activities of forest insects to make such areas satisfactory for continued timber production and management.

The stands, with few exceptions, included in the Cone Mountain, Harvey Mountain, Gordon Creek, Logan Mountain, Crater Mountain, Bogard and Butte Units, we feel have a sufficient margin of health and vigor of stands as well as sufficiently favorable environmental conditions to warrant control. Except under markedly more unfavorable conditions, we feel such areas will continue as satisfactory timber producing areas, and that control projects against greater than normal infestations will yield results.

We feel the present day outbreaks of insect activity in these areas are evidence of the fact that present trends have resulted in the initiation of insect activity. Given changes for the better, control should not be necessary in the future but given changes for the worse, the status of the areas, as regards control, will be changed.

TABLE I  
PLOT LOSSES - LASSIE NATIONAL FOREST  
PER SECTION BASIS

|       |             |               |          |               |          |          |               |               |                |           |                |
|-------|-------------|---------------|----------|---------------|----------|----------|---------------|---------------|----------------|-----------|----------------|
| :     | 1932        |               |          | :             | 1933     |          |               | :             | 1934 Estimated |           |                |
| Plot: | :           | Volume        | :BM.per: | :             | Volume   | :BM.per: | Rel. to:      | :             | Volume         | :BM. per: | Relation to    |
| No.:  | Trees:      | B.M.          | : Acre   | Trees:        | B.M.     | : Acre   | :1932 %       | Trees:        | B.M.           | : Acre    | :1933 Per Cent |
| 1     | :           | 104: 169,310: | 265:     | 112: 117,060: | 183:     | -31 :    | 110: 127,350: | 199:          | +              | 9         |                |
| 2     | :           | 182: 113,000: | 177:     | 190: 171,140: | 267:     | +51 :    | 245: 237,800: | 372:          | +              | 39        |                |
| 3     | :           | 170: 187,320: | 293:     | 138: 155,880: | 244:     | -17 :    | 228: 257,720: | 403:          | +              | 65        |                |
| 4     | OUT IN 1934 |               |          |               |          |          |               |               |                |           |                |
| 5     | :           | 98: 103,480:  | 162:     | 66: 67,920:   | 106:     | -46 :    | 106: 105,670: | 165:          | +              | 56        |                |
| 6     | :           | 430: 236,440: | 369:     | 144: 76,600:  | 120:     | -67 :    | 153: 87,600:  | 137:          | +              | 14        |                |
| 7     | :           | 78: 87,200:   | 136:     | 92: 90,320:   | 141:     | + 4 :    | 138: 112,800: | 176:          | +              | 26        |                |
| 8     | :           | 182: 142,260: | 222:     | 214: 206,020: | 322:     | +45 :    | 284: 314,440: | 491:          | +              | 52        |                |
| 9     | :           | 188: 179,940: | 281:     | 246: 177,020: | 277:     | - 2 :    | 236: 159,110: | 249:          | -              | 10        |                |
| 10    | :           | 170: 130,720: | 204:     | 126: 64,060:  | 100:     | -51 :    | 275: 166,700: | 260:          | +              | 160       |                |
| 11    | :           | 56: 89,410:   | 140:     | 60: 103,020:  | 161:     | +15 :    | 154: 254,500: | 398:          | +              | 147       |                |
| 12    | :           | 28: 57,820:   | 90:      | 32: 70,340:   | 110:     | +22 :    | 52: 125,440:  | 196:          | +              | 78        |                |
| 13    | :           | 172: 165,480: | 258:     | 102: 143,840: | 225:     | -13 :    | 90: 90,630:   | 142:          | -              | 37        |                |
| 14    | :           | 120: 172,040: | 269:     | 206: 228,360: | 357:     | +33 :    | 560: 645,830: | 1,009:        | +              | 183       |                |
| 18*   |             |               |          |               |          |          | :             | 475: 309,360: | 483:           |           |                |
| 19*   |             |               |          |               |          |          | :             | 949: 522,440: | 816:           |           |                |
| AVE.: | 152:        | 141,109:      | 220:     | 133:          | 128,583: | 201:     | - 9 :         | 202:          | 206,584:       | 323:      | + 61           |

\* Not cruised previous to 1934.

TABLE II

ESTIMATED PER SECTION AND UNIT LOSSES  
LASSEN NATIONAL FOREST

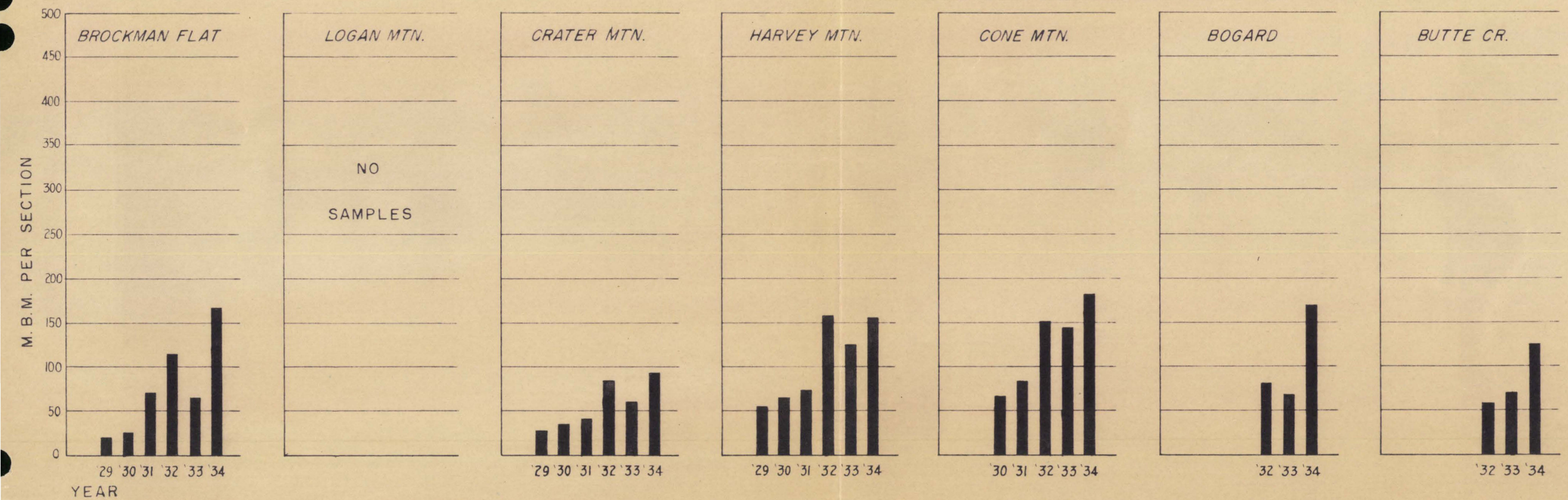
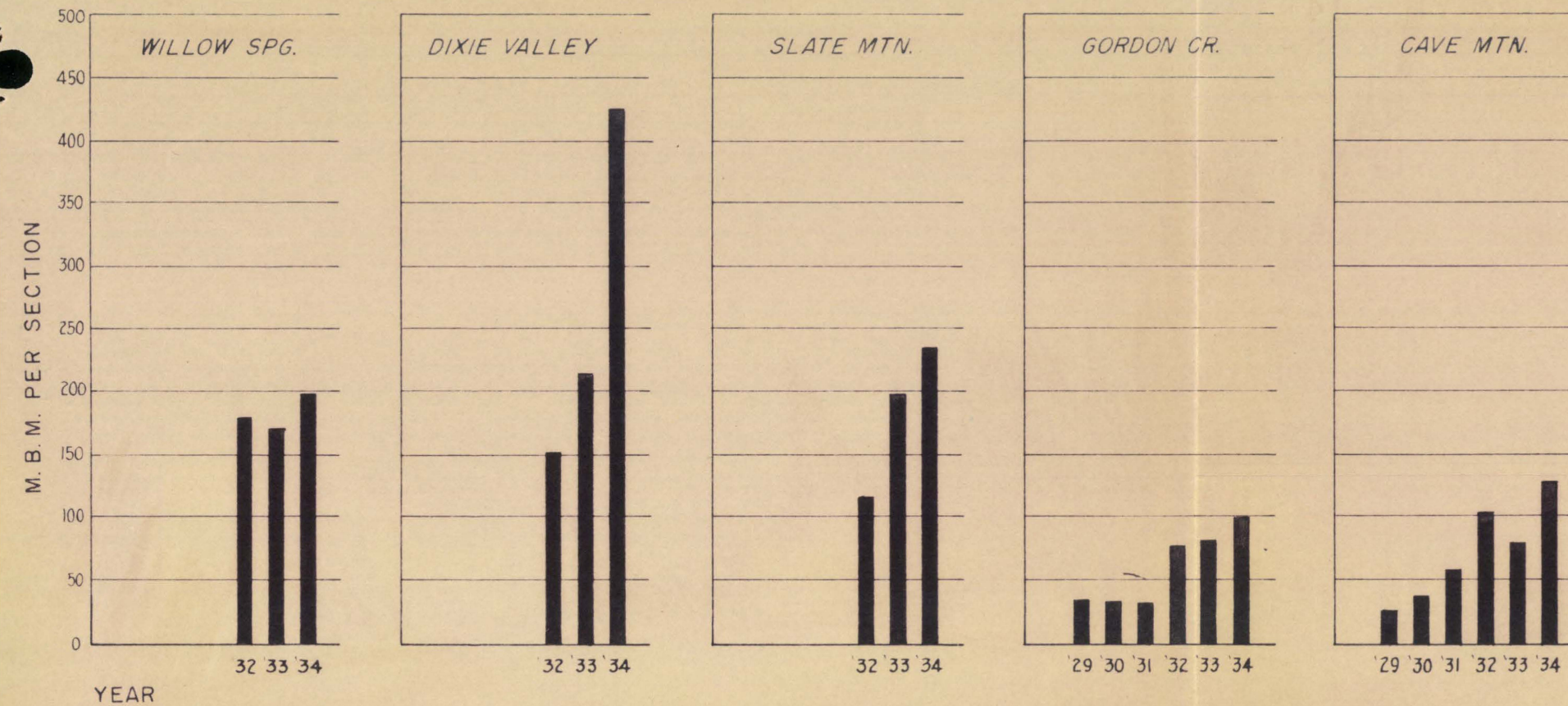
|                 | 1932 Losses |                           |                 |                 | 1933 Losses     |                 |                 |                 | 1934 Losses     |                 |                 |                 |         |
|-----------------|-------------|---------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|---------|
|                 | : Acres :   |                           | Per section :   |                 | Per Unit :      |                 | Per Section :   |                 | Per Unit :      |                 | Per Section :   |                 |         |
| UNIT            | (1)         | Trees:Vol. BM.:           | Trees:Vol. BM.: | Trees:Vol. BM.: | Trees:Vol. BM.: | Trees:Vol. BM.: | Trees:Vol. BM.: | Trees:Vol. BM.: | Trees:Vol. BM.: | Trees:Vol. BM.: | Trees:Vol. BM.: | Trees:Vol. BM.: |         |
| Willow Springs: | 51,750:     | 261:                      | 180,700:        | 21,088:         | 14,600:         | 210:            | 170,000:        | 16,970:         | 13,736:         | 318:            | 198,040:        | 25,695:         | 16,000  |
| Dixie Valley :  | 55,340:     | 161:                      | 152,190:        | 13,920:         | 13,164:         | 211:            | 213,470:        | 18,250:         | 18,465:         | 309:            | 424,900:        | 26,728:         | 36,754  |
| Slate Mtn. :    | 35,225:     | 130:                      | 114,700:        | 7,150:          | 6,308:          | 153:            | 148,170:        | 8,415:          | 8,149:          | 211:            | 236,780:        | 11,605:         | 13,023  |
| Gordon Creek :  | 7,020:      | 68:                       | 76,300:         | 750:            | 839:            | 81:             | 79,030:         | 883:            | 861:            | 120:            | 98,700:         | 1,308:          | 1,076   |
| Cave Mtn. :     | 10,990:     | 108:                      | 101,700:        | 1,860:          | 1,749:          | 103:            | 81,570:         | 1,770:          | 1,403:          | 184:            | 130,760:        | 3,165:          | 2,249   |
| Brockman Flat : | 12,670:     | 148:                      | 114,380:        | 2,930:          | 2,265:          | 126:            | 64,060:         | 2,495:          | 1,268:          | 275:            | 166,700:        | 5,445:          | 3,300   |
| Logan Mtn. :    | 6,144:      | - N o e s t i m a t e s - |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |         |
| Crater Mtn. :   | 14,272:     | 81:                       | 88,160:         | 1,806:          | 1,966:          | 57:             | 59,430:         | 1,271:          | 1,325:          | 92:             | 92,470:         | 2,052:          | 2,062   |
| Harvey Mtn. /:  | 13,840:     | 141:                      | 158,140:        | 3,500:          | 3,922:          | 134:            | 124,830:        | 2,894:          | 2,696:          | 174:            | 156,300:        | 3,758:          | 3,376   |
| Cone Mtn. 2:    | 38,000:     | 121:                      | 151,650:        | 7,137:          | 9,008:          | 151:            | 144,100:        | 8,954:          | 8,545:          | 176:            | 182,570:        | 10,436:         | 10,826  |
| Bogard 3:       | 19,800:     | 52:                       | 80,000:         | 1,607:          | 2,472:          | 40:             | 67,990:         | 1,236:          | 2,101:          | 103:            | 169,660:        | 3,183:          | 5,242   |
| Butte Creek :   | 56,290:     | 28:                       | 57,820:         | 2,464:          | 5,088:          | 32:             | 70,340:         | 2,813:          | 6,183:          | 52:             | 125,440:        | 4,570:          | 11,026  |
| Total Averages: | 321,341:    | 118:                      | 115,976:        | 64,262:         | 61,381:         | 118:            | 111,181:        | 65,951:         | 64,732:         | 183:            | 180,211:        | 97,945:         | 104,934 |

(1) Areas as of 1933. Harvey Mountain approximately corrected to 1934.

EASTERN LASSEN WORKING CIRCLE  
LASSEN NATIONAL FOREST, CALIFORNIA

INSECT LOSSES  
1929 - 1934

ANNUAL M.B.M. LOSSES  
PER SECTION BY UNITS



 PLOT  
 BOUNDARY - REGIONAL SURVEY AREA  
 BOUNDARY - INSECT CONTROL UNIT  
 LITTLE VALLEY CONTROL PROJECT  
 BLACKS MTN. CONTROL " "  
 CRUISED TRAVERSES  
 BLACKS MTN. EXP. FOREST (BOUND.)

